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STATED MEETINGS

Of the Entomological Section of The Academy of Natural Sciences of Philadelphia, and of The American Entomological Society will be held at 7.30 o'clock P. M. on the following dates during 1924: January 24, February 28, March 27, April 24, May 22, September 25, October 23, November 20, and Dec. 8.

Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

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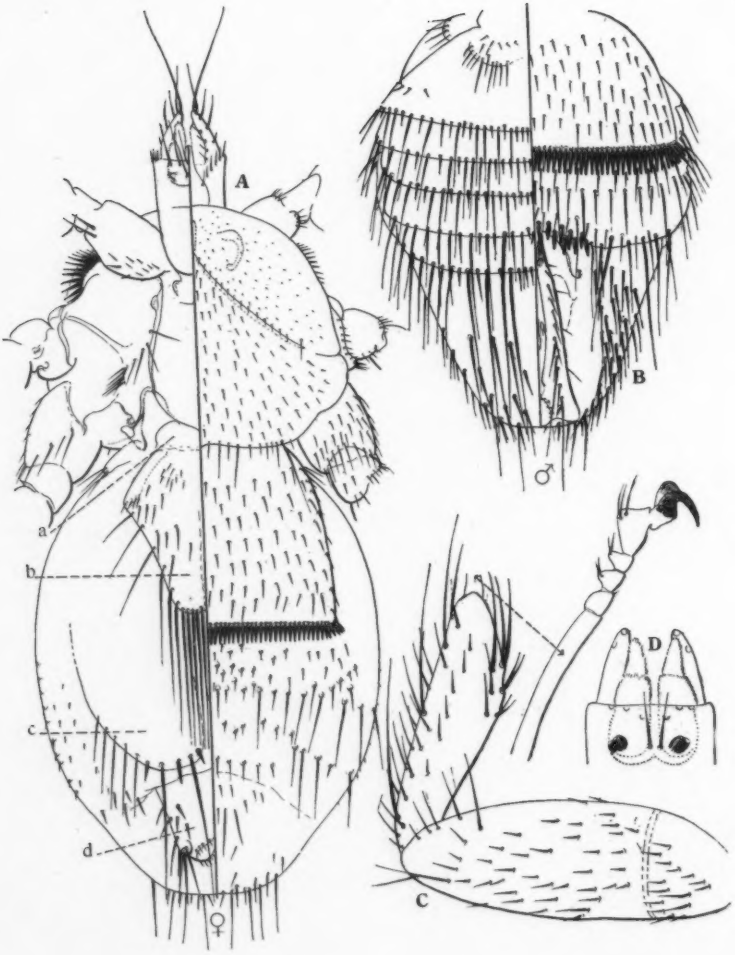

BASILIA SPEISERI (RIBIERO). A, FEMALE; B, ABDOMEN OF MALE; C, ANTERIOR LEG; D, EYES. IN FIGURES A AND B THE LEFT HALF IS THE DORSAL, THE RIGHT HALF THE VENTRAL, ASPECT.—FERRIS.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

VOL. XXXV JUNE, 1924 No. 6

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The New World Nycteribiidae (Diptera Pupipara).

By G. F. FERRIS, Stanford University, California.

(Plate III and Text figure 1.)

The bat-infesting family Nycteribiidæ, of the Diptera Pupipara, seems to be very weakly represented in the Western Hemisphere. Up to the present time but eight species have been described from North and South America together, while from the remainder of the world approximately sixty have been recorded. This disparity has been noted by Speiser and Scott, the two recent authorities upon the group, and that it actually expresses a biological condition is attested by the experience of the present writer.

Some years ago I examined the alcoholically preserved bats in the United States National Museum, going over the entire collection. The examination was quite fruitful, so much so that the resulting collection of bat parasites is probably among the largest now extant. The American bats were naturally well represented in the material examined, yet from them but three species of Nycteribiids were obtained. It became very evident

in the course of the examination that the American bats are actually much less infested, both in regard to the number of individuals as well as the number of species of parasites than are the Old World bats. The actual center of abundance seems to be in the region of the Indian Ocean, as the two authors mentioned have previously noted.

In presenting a report upon the available American material of the Nycteribiidæ, I am taking advantage of the opportunity to give a resumé of the group as represented in the New World. The material upon which the report is based has come largely from the bats in the National Museum, although certain material from other sources is available. Representatives of all the species obtained from the National Museum will be deposited in the collections of that institution. The remainder of the material is in the Stanford University collection.

The New World Genera.

The New World species of this family have been referred to under five generic names, *Nycteribia, Penicillidia, Cyclopodia, Basilia* and *Pseudelytromyia*. Of these I am recognizing but two, *Basilia* and *Nycteribia*. The reasons for rejecting the others will be discussed in connection with the last two genera.

These two genera may be recognized by the following key, which is based upon the work of Speiser and Scott.

1. With distinct thoracic and abdominal ctenidia; tibiæ not ringed.
2. Eyes present, two-facetted.....*Basilia*.
   Eyes entirely lacking.....*Nycteribia*.

Genus **Nycteribia** Latr.

Two North American species, *N. mexicana* Bigot and *N. antrozoi* Townsend, originally described in this genus, are now referred to *Basilia*. Two South American species, *N. flava* Weyenberg and *N. bellardii* Rondani, are retained in it, for the present at least, although in the case of the former the position is doubtful.

Nycteribia bellardii Rondani.

1878. *Nycteribia bellardii* Rondani, Ann. Mus. Civ. Genova 12:152.

1901. *Nycteribia* (*Acrocholidia*) *bellardii* Rond., Speiser, Arch. f. Naturgesch. 67 (1) :46.
Records. From *Phyllostoma* sp., Brazil.

Notes: Speiser (ref. cited) has redescribed the female of this species. Its position as a member of the genus *Nycteribia* may be regarded as fairly definite.

Nycteribia flava Weyenberg.

1881. *Nycteribia flava* Weyenberg, Ann. Soc. Cientif. Argentina 11 :104.
1901. *Nycteribia* (*Acrocholidia*) *flava* Wey., Speiser, Arch. f. Naturgesch. 67 (1) :62.
Records. From *Vespertilio* (*Vesperugo*) *velatus,* Argentina.

Notes: Speiser has merely listed this species, apparently with doubt, under the sub-genus *Acrocholidia* of *Nycteribia.* I have not seen the description.

Genus **Basilia** Ribiero.

1903. *Basilia,* Ribiero, Archivos do Museo Nacional do Rio de Janeiro 12 :175.
1907. *Pseudelytromyia,* Ribiero, ibid. 14 :233.
1908. *Basilia,* Speiser, Zeits. f. Wiss. Ins. Biologie 13 :437.
1913. *Cyclopodia,* Brethes, Bol. del Museo Nacional de Chile, pp. 1-4, figs.

The genus *Basilia* is distinguishable from *Penicillidia* only by the fact that in the former the eyes are two-facetted, while in the latter they are one-facetted. This distinction holds and may possibly be valid, although I am somewhat inclined to be dubious as to its importance. Actually *Penicillidia dufouri* (Wesw.), the type of *Penicillidia,* is not so very different from the forms referable to *Basilia* and I have, in the case of some other members of the family, seen some evidence that the character of the eyes is likely to be misleading. However, I am accepting the genus *Basilia.* On the other hand the genus *Pseudelytromyia,* as Speiser has pointed out, seems not at all worthy of separation from *Basilia.*

Brethes (ref. cited) seems to have been very much confused as to generic characters in this group, inasmuch as he placed *Basilia* as a synonym of *Cyclopodia.* There is no evidence that *Cyclopodia* occurs in the New World.

A discussion of the generic characters of the genus *Basilia*

may not be out of place and may be illustrated by reference to the figures of *B. speiseri* (Ribiero) (Plate III).

In the four species examined by me there is a rather close adherence to a certain general type. The head appears to be normally rather elongate and slender, although in some specimens it is somewhat conical, probably because of distortion. It is almost destitute of setæ except for a very few between and in front of the eyes and along the cephalic margin. The eyes are usually distinctly two-facetted, although in some specimens the facetting is somewhat obscure, possibly because of an unfavorable angle of view. The palpi are characteristically slender and tipped by a long seta and several other shorter setæ.

The thorax is in general somewhat wider than long, without any markedly distinctiye characters. The thoracic ctenidia are well developed and contain numerous teeth. The legs (Pl. III, Fig. C) have the femur and tibia slightly flattened, the latter strongly haired, the setæ on the inner margin especially stout and arranged in two or three series on the apical half.

The abdomen of the female, as in all the members of the family, is difficult to describe because of the extensive membranous areas and the difficulty of homologizing the parts. After a careful comparison of the four species available I have adopted the view that there are four dorsal areas which may be homologized throughout. These four areas appear as the tergites of individual segments but that they are so is extremely doubtful. It is possible that they are really compound, being formed by the fusion of two or more segments. In order to avoid an expression of opinion as to which segments they may represent I am simply referring to them as tergites *a*, *b*, *c* and *d*. Tergite *a* (the basal tergite) varies from a very small piece in *B. speiseri* to one occupying nearly one-third of the dorsal aspect of the abdomen in *B. antrozoi*. Tergite *b* is divided by a longitudinal median suture into two lobes which may be approximate as in *B. speiseri* and *B. forcipata* or very widely separated as in *B. corynorhini*. The apices of these lobes are usually beset with long setæ but are not so in *B. corynorhini*. Tergite *c* consists of a pair of lobes separated by a median membranous area as in *B. speiseri, corynorhini* and

antrozoi or fused into a single piece as in *B. forcipata.* It is characteristically tipped by long setæ. Tergite *d* is a part of the apical segment which bears the anus. At times this segment may be so retracted that it is scarcely visible from the dorsal aspect.

The ventral side is even more difficult to describe definitely because of the greater membranous areas. There are seven pairs of spiracles, these borne along the lateral margins and usually somewhat difficult to distinguish because of their small size and the numerous setæ and tubercles. The basal sternite bears a ctenidium with as many as sixty teeth.

The male is similar to the female in the form of head and thorax, but as in all the members of the family, the abdomen is very different. There are seven very evident segments visible dorsally and there are seven pairs of spiracles but not more than five sternites can be recognized. The terminal segment is very broad and blunt and in all the species examined the forceps are long and slender. Specific characters are very poorly marked and the recognition of species from this sex when not associated with the female is very dubious. Species should not be described from the males alone.

Basilia ferruginea Ribiero.

1903. *Basilia ferruginea* Ribiero, Archivos do Museo Nacional do Rio de Janeiro 12:175-9; pl. (Des. of male).
1907. *Basilia ferruginea* Rib., Ribiero, ibid. 14:231-2. (Des. of female).

Records. From *Vespertilio auranteus,* Minas Geræs, and *Atalapha frantzii,* Rio de Janeiro, Brazil.

Notes: The description of the male given by Ribiero is accompanied by an excellent figure, but unfortunately that of the female is not and will scarcely permit its positive recognition. As I have pointed out this practically precludes the identification of the species.

Basilia mexicana (Bigot).

1885. *Nycteribia mexicana* Bigot, Ann. Soc. Ent. France (6) 5:245.
1902. *Penicillidia mexicana* (Bigot), Speiser, Zeits. f. syst. Hym. und Dipt. 2:171-2.

Records. From undetermined host in Mexico.

Notes: Speiser (ref. cited) has redescribed the type of this species but it is very doubtful that the species can be recognized from this redescription. This author regarded the species as possibly the female of *B. antrozoi* (Townsend) but at the best this was merely a guess. I am referring it to *Basilia* simply on the basis of probabilities, although there is no information as to the character of the eyes.

Basilia antrozoi (Townsend).

1893. *Nycteribia antrozoi* Townsend, Jn. N. Y. Ent. Soc. 1:79. (desc. of male).
1902. *Penicillidia mexicana* (Bigot), Speiser, Zeits. f. syst. Hym. und Dipt. 2:172.
1916. *Penicillidia antrozoi* (Townsend), Ferris. Ent. News 27:434-5; pl. 22, f. 1-2. (Desc. of male and female).

Previous records. Recorded by Townsend from *Antrozous pallidus* in New Mexico and by Ferris from *A. pallidus pacificus* in California.

Specimens Examined. Those upon which the previous record by Ferris was based and the following: from *Antrozous pallidus pacificus,* Dulzura, Calif. (U. S. N. M.) and Stanford University, Calif. (J. C. Chamberlin): *A. pallidus minor* and *Myotis californicus,* Santa Anita, Lower California, Mexico (U. S. N. M.): *Corynorhinus macrotus pallescens,* East Painted Cave, Texas (U. S. N. M.): *Nyctinomus cynocephalus,* New Orleans, La. (U. S. N. M.).

Notes: While this species appears to be characteristically a parasite of *Antrozous,* the records given above indicate its occurrence on other hosts, unless there has been some mixing.

Basilia corynorhini (Ferris).

1916. *Penicillidia corynorhini* Ferris, Ent. News 27:435-6; pl. 23, f. 3.

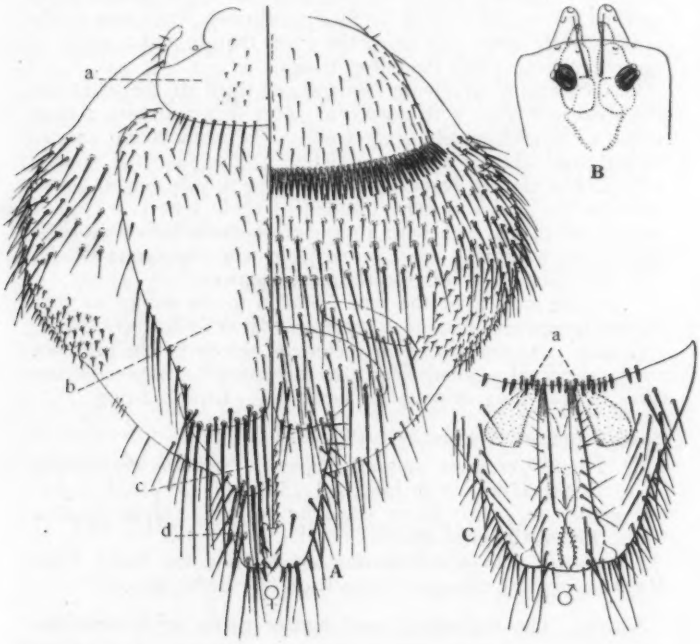
Records. Known from a single female from *Corynorhinus macrotus pallescens.*

Notes: I have nothing to add to the original description.

Basilia forcipata n. sp., Text-fig. 1.

Specimens examined. Holotype (a female) and allotype and one paratype male from *Myotis californicus quercinus,* Covina, Calif. (A. B. Howell): a single female from *Nyctinomus cynocephalus,* New Orleans, La. (U. S. N. M.): four females from *Myotis thysanodes,* Cloverdale Hills, New Mexico

(U. S. N. M.), one female from the same host at Hacienda La Parada, San Louis Potosi, Mexico and one from the same host at Old Fort Tejon, Calif. (both U. S. N. M.).



Text Fig. 1.—*Basilia forcipata* n. sp. A, abdomen of female, the left half the dorsal, the right half the ventral aspect; B, eyes; C, terminal abdominal segment of male from ventral aspect.

♀.—Length 2 mm. *Head* with the normal characters of the genus, the eyes (Fig. *B*) deeply pigmented and distinctly two-facetted. *Thorax* without distinctive characters.

Abdomen (Fig 1*A*) with the apparent first tergite (*a*) quite large and with a row of setæ along the posterior margin; second tergite (*b*) much elongate, occupying the greater part of the dorsal aspect of the abdomen, slightly narrower at the apex than at the base, divided longitudinally by a faint median suture; the surface with numerous small setæ, the lateral margins with slender setæ which become longer toward the apex,

the apex with a row of about eight long, stout setæ on each lobe. Third tergite (*c*) quite short and broad, partially concealed by the second, with a cluster of three or four long and several smaller setæ at each apical angle. Terminal segment (*d*) quite strongly chitinized, deeply divided into two rather slender lobes each of which bears three or four moderately long setæ at the apex, several stout setæ along the inner margin and a series of quite long setæ along the outer margin.

Basal sternite occupying perhaps one-third of the length of the abdomen, beset with numerous short setæ and with a ctenidium of approximately sixty teeth. The connexivum caudad of the basal sternite bears two distinct transverse rows of long setæ and is thickly beset with short setæ which extend somewhat to the dorsal aspect. Caudad of these setæ is a pair of small, oval plates, each with a number of moderately long setæ. Caudad of these is a short, broad plate with numerous slender setæ and caudad of this the terminal segment.

♂.—The male is of the type common to the genus, so very closely resembling that of *B. speiseri* that it is scarcely distinguishable. It seems to be characterized chiefly by the presence on the terminal segment of a pair of internal chitinous structures (Fig. 1 *C,a*) of doubtful homology. Length 2 mm.

Basilia speiseri (Ribiero). Pl. III.

1907. *Pseudelytromyia speiseri* Ribiero, Archivos do Museo Nacional do Rio de Janeiro 1:233-5; pl. 23; pl. 24, f. 2-4.

Previous records. From *Atalapha frantzii*, Quinta de Boa Vista, Rio de Janeiro, Brazil.

Specimens examined. Eleven females and ten males from *Myotis nigricans*, Sipurio, Costa Rica (U. S. N. M.).

Notes: The description and figures given by Ribiero are sufficient to permit the reasonably certain determination of the species, but as it has been used as the type of a genus I am here figuring and describing it in somewhat more detail.

♀. (Pl. III, Fig. *A*).—With the general characters of the genus as described. Abdomen with the basal tergite (*a*) very small and inconspicuous, without setæ. Second tergite (*b*) occupying about one-third of the length of the abdomen, divided by a faint median suture into two lobes, each of which bears six to eight, long, slender setæ at the apex and a few slender setæ along the margin. Third tergite (*c*) composed of two well separated, broad lobes which are destitute of setæ except along the posterior margin where there are two or three very long and two or three short, stout setæ and along the lateral margin where

there are a few slender setæ. Tergite four (*d*) short, the apices of the inconspicuous lobes with three or four stout setæ.

Basal sternite occupying nearly one-half the length of the abdomen, the ctenidium with approximately sixty teeth. Remainder of the ventral side entirely membranous. Four transverse rows of setæ of various lengths may be distinguished and the surface is sparsely beset with small, scattered setæ.

♂. (Pl. III, Fig. *B*).—The male presents no specially distinctive characters and I am unable to indicate any positive characters by which it may be separated from the male of *B. antrozoi* or, on the basis of Ribiero's figure, from the male of *B. ferruginea*. From the male of *B. forcipata* it may be separated as indicated in the description of the latter.

Basilia silvae (Brethes).

1913. *Cyclopodia silvæ* Brethes, Bol. del Museo Nacional de Chile, pp. 1-4, figs.

Notes: The original description of this species is not available to me. I am referring it to *Basilia* on the basis of a statement by Scott[1] to the effect that Brethes had placed *Basilia* as a synonym of *Cyclopodia*, which it certainly is not and on the basis of a strong probability that *Cyclopodia* is not represented in the New World.

The Life-History of Mitoura loki Skinner (Lepid.: Lycaenidae).

By KARL R. COOLIDGE, Hollywood, California.

Mitoura loki, known only from Southern California; was described from specimens taken by W. S. Wright, at Mt. Springs, San Diego County, California, July 5th, 1906, and this type locality appears to be the only habitat thus far recorded. On May 31st, 1920, I caught a worn female of *loki* in Mint Canyon, about fifty miles northeast of Los Angeles, a region very similar to that in which the species was discovered. This past season *loki* was found to be plentiful in this locality and long series were netted by local collectors.

On April 29th, I took twenty specimens, mostly fresh females. The males were more or less worn, indicating that the species had been in flight a week or more. Mint Canyon leads into

[1]Scott, H. Parasitology 9:606. (1917.)

Palmdale, where begins the Mohave Desert, and it is here that the Juniper belt becomes a conspicuous part of the flora, though isolated clumps of Juniper are to be found but a few miles out of Los Angeles.

California Juniper (*Juniperus californica* Carr) is a bushy shrub two to fifteen feet high, or sometimes a tree up to twenty-five feet in height. It is at home principally in the arid desert foothills, being most abundant on the western Mohave Desert, especially along the desert slopes of the Sierra Madre, Sierra Liebre, Tehachapi and San Bernardino ranges. Southward, the Juniper belt continues along both slopes of the San Jacinto Mountains into Lower California; northward, in the Sierra Nevadas to Kern River Valley, and at scattered intervals along the inner Coast Range as far north as Mt. Diablo, in Contra Costa County; westward, to the San Rafael Mountains. A narrow belt also occurs in Lake County. It is quite possible that *loki* will be found to occur throughout the entire range of its food-plant.

Three female *loki* were confined with sprigs of Juniper on April 29th, and on the following day five eggs were laid. A time record of the transitions follows:

Eggs laid April 30th.	Passed third moult June 16th.
Hatched May 9th.	Passed fourth moult June 28th.
Passed first moult May 20th.	Suspended July 8th.
Passed second moult June 4th.	Pupa disclosed July 11th.

As Mr. Wright's specimens were taken in July, and mine in April, I suspected that there might be two broods, and so visited Mint Canyon on a number of occasions throughout July. No imagoes were encountered, however, and as my pupae also failed to disclose, I am now satisfied that there is but one brood and that the flight of this extends over a considerable period of time.

The eggs are placed on the tips, or close to the tips, of the food-plant, sometimes tucked in between the chinks of the overlapping scales. In all cases where I found the eggs in nature, the concealment was very poor, the eggs showing up conspicuously against the dark green coloration of the food-plant.

In hatching, the young larvae escape by eating out rather

large holes in the summit or side of the egg, more often the latter, and once free from the shell do not devour any more of it. The habits of the larvae are very similar to those of other species of *Mitoura*. They attack only the tips of the sprigs of Juniper, the first thoracic segment covering the head while feeding as though with a cowl. During the moulting periods the larvae crawl back a considerable distance from the tips.

The Egg.—In shape a greatly depressed echinoid, with the summit but slightly depressed and as broad as the base. The micropyle not greatly depressed, .10 mm. in diameter, of a deeper green than rest of egg; the micropyle rosette composed of about a dozen nearly uniform round cells, .02 mm. in diameter, outlined in but scarcely raised yet distinct delicate lines.

Surface of egg profusely studded with large elevated conical protuberances, .02 mm. in height and .04 mm. in breadth at base, connected with one another by fairly distinct, slightly irregular ridges, which run up the protuberances as buttresses. These conical protuberances, with their connecting ridges, form quadrate or subtriangular cells, averaging .04 mm. in diameter, and not disposed with any definite regularity. The surfaces of the cells minutely punctate.

Color, a very delicate pale green, with the raised net-work white. Diameter .76 mm. Height .42 mm.

Larva, First Instar.—Head smooth, shining, pale brown, .24 mm. in width; ocellar field black; frontal triangle outlined in reddish brown; mouth parts red brown.

A supralateral series of papillae, one to a segment on either side, located on anterior margin of segment and bearing a short, straight, sharp, colorless, spiculiferous hair, but .06 mm. in length. A laterostigmatal series of papillae, one to a segment on either side, located in line with the supralateral series and bearing hairs of about the same length. Two laterodorsal conical papillae on either side, with the arising hairs .60 mm. in length, colorless, spiculiferous, arcuate. These papillae are nearly equal, centrally located on the segments, .04 mm. in height, of the body ground color except the summit, which is fuscous-ringed.

Substigmatally, four fuscous papillae, bearing outwardly directed, fairly straight, sharp, colorless, rather heavily spiculiferous hairs, .20 mm. in length. Between the laterodorsal series of papillae and the stigmata two smooth naked hemispherical lenticles, the inner one the larger, .02 mm. in diameter; the outer .01 mm. in diameter, and a little back of the larger.

On the last compound segment a curving series of similar lenticles, slightly unequal in size, just ahead of a circular coriaceous depression. On first thoracic a similar but lozenge-shaped shield, laterally produced. Stigmata obovate, .009 mm. in diameter, with a fine fuscous ring.

Color of body a rather deep lemon yellow, somewhat tinged with green along the dorsal area. As the larva feeds it becomes more and more of a dark green, with irregular blotchings of reddish brown, until finally the original coloration is entirely obscured. Ventral surface and prolegs slightly brighter yellow than above; legs very pale subhyaline shining yellow. First thoracic segment pallid.

Length, at birth, 1.18 mm. Width at first thoracic segment .32 mm. Width at anal segment .28 mm.

Second Instar.—Head smooth, shining, pale red brown, .60 mm. in width; ocellar field black.

Whole body bristling with numerous straight sharp spiculiferous hairs, arising from narrow red brown tubercles, .02 mm. in height, or less for the smaller hairs. These hairs varying in size, the longest .30 mm. in length, the shortest .06 mm. They are nearly all reddish brown tinged, only a few being colorless. Spiracles obovate, .02 mm. in diameter, with a fine brown ring. Dorsal shield pale brown, subtriangular.

Body now green, irregularly mottled with blotchings of reddish brown, but as the stage proceeds these blotchings fade into deep green. Substigmatally, the green coloration is replaced by a more vivid yellow green, to the naked eye appearing as a fairly well defined stripe, and becoming more and more yellowish, with less green, as the instar advances. Prolegs and ventral surface pale gray green; legs very pale reddish brown, subhyaline.

Length 2.60 mm. Width at first thoracic segment .65 mm. Width at second thoracic .80 mm. Width at anal segment .54 mm.

Third Instar.—Head smooth, shining, pale brown, .88 mm. in width; ocellar field black.

Whole body, as in previous stage, bristling with numerous straight sharp spiculiferous hairs, arising from red brown tubercles. The hairs averaging .28 mm. in length, mostly reddish brown tinged, only a few being colorless. Spiracles obovate, .035 mm. in diameter, with a fine brown ring. Dorsal shield pale brown, subtriangular.

Body in color deep green. The infrastigmatal yellow band more strongly developed, increasingly so as the stage develops. Prolegs and ventral surface a pale gray green; legs subhyaline pale reddish brown.

Length 3.40 mm. Width at first thoracic .90 mm. Width at anal segment .80 mm.

Fourth Instar.—Head smooth, shining, pale brown, 1.20 mm. in width; ocellar field black; frontal triangle and mouth parts fuscous.

Whole body as before, bristling with numerous sharp, straight, spiculiferous hairs, varying in size, some as short as .08 mm., others up to .35 mm., and arising from narrow red brown tubercles. Hairs prominently reddish brown tinged, quite heavily infuscated at tips, a few hairs colorless. Spiracles obovate, .045 mm. in diameter, with a fine brown ring. Dorsal shield pale brown, subtriangular.

Body in color deep green, laterally with irregular blotchings of a still deeper green. The crenate infrastigmatal yellow band conspicuous, and increasing in prominence as the instar proceeds. The dorsal ridge bordered on either side with a line of green-yellow, not as prominent as the infrastigmatal stripe. Ventral surface and prolegs bluish green; legs very pale reddish brown, subhyaline.

Length 4.20 mm. Width at first thoracic segment 1.30 mm. Width at anal segment 1.15 mm.

Fifth Instar.—Body largest anteriorly, tapering only slightly posteriorly, but rapidly on final two abdominal segments. Anal segment well rounded and at extreme tip subtruncate. Body rather strongly hunched, falling off abruptly at posterior margin, with three median depressions: a dorsal, very slight; one lateral, more distinct; the third much deeper and connecting with the one above so as to form a C, open anteriorly, and in the deepest part of which the spiracles are situated. On second thoracic the two upper depressions run together into a transverse sulcus.

Head smooth, shining, pale brown, 1.40 mm. in diameter; ocellar field black; frontal triangle and mouth parts fuscous.

As before, whole body bristling with numerous straight, sharp, spiculiferous hairs, arising from rather high but narrow tubercles, averaging .04 mm. in height with the issuing hairs varying in size, from .12 to .40 mm. in length. For the most part the hairs are strongly tinged with reddish brown, only a few, and these usually the shorter ones, being colorless. Spiracles broadly obovate, pallid, with a fine brown ring, .08 mm. in diameter. Dorsal shield of first thoracic rather deep, pale brown, lozenge-shaped with emarginate sides.

Body in color dark velvety green, considerably deeper green than the sprigs of Juniper. The yellow sublateral dashes conspicuous, slightly oblique, more or less tinged with green; the

dashes sublunate, largest anteriorly, on first thoracic more or less obscure. The infrastigmatal band also composed of yellow dashes, but here straighter and slenderer, and forming more of a continuous band. But as the instar goes on, both of these series of dashes change from yellow to white. Half way between, on posterior edge of segments, a short, straight, greenish white bar, not at all conspicuous. Ventral surface and prolegs concolorous with above; legs pellucid yellow green basally, fuscous tipped.

Length 11. mm.; at maturity 14.50 mm. Width at first thoracic segment 3.10 mm. Width at anal segment 2.60 mm.

Chrysalis.—Viewed from above: Thorax shorter and considerably narrower than abdomen, scarcely narrowing at junction to abdomen; narrowing considerably anteriorly, well arched, head prominence not sharply breaking regularity of curve, basal wing tubercles weak. Abdomen regularly curved, broadly rounded at the posterior segment.

Viewed laterally: Abdomen considerably higher than highest point of thorax. The junction between the thorax and abdomen indicated by a well-rounded hollowing. Thorax most prominent just back of middle of mesothorax, curving thence forward and downward rapidly. Abdomen roundly arched, highest at third and fourth segments. Posterior abdominal segments sloping a little more rapidly than thoracic segments, the last abdominal segment posteriorly being perpendicular. Ventrally flattened.

Whole body marked with an interlacing net-work of raised lines, not disposed in any regularity of pattern, and with the points at the intersections sometimes slightly raised so as to form minute naked warts. These raised lines slightly darker than ground color, low and equal, forming rather large cells, which are profusely sprinkled with minute ovate punctulations. Another series of larger warts, in the cells formed by the raised lines, or on the lines themselves, rather profusely and irregularly scattered, .02 mm. in diameter and concolorous with body. These larger warts give rise to short, sharp, spiculiferous hairs, generally very straight, only a few slightly curving, varying in size, some as long as .20 mm., others but .10 mm. The hairs dark brown in color. Spiracles long oval, luteous, white lipped, 1.4 mm. in length.

Color a rich wood brown, the abdomen blotched somewhat with ferruginous, but not conspicuously so. Length 8.50 mm. Greatest width of abdomen 4.30 mm. Greatest width of thorax 3.20 mm. Greatest height of abdomen 4. mm. Greatest height of thorax 3. mm.

Preliminary Note upon the Pseudoscorpions as a Venomous Order of the Arachnida.

By JOSEPH CONRAD CHAMBERLIN, Stanford University, California.

Recently in the course of my studies upon the morphology of the Pseudoscorpions, I discovered what appear to be, with little doubt, the poison ducts of these animals and the point of their debouchement.

This discovery is of particular interest, inasmuch as they have heretofore been generally regarded as a non-venomous order of the Arachnida. Support of this view was largely of a negative character. They do not possess the caudal poison sting of the true scorpions and those glands which are almost surely the homologues of the poison glands of the spiders, are here modified into silk-secreting organs. These facts coupled with their small size and consequent inability to inflict spectacular injuries have largely contributed to this belief. Since the galea would eliminate the possibility of the silk secretion serving also as a venom (in most of the species at least), there remain but two effective ways in which they could function as venomous organisms.

In the first place we have the possibility of the saliva or some saliva-like secretion serving this purpose. This is rendered improbable, however, when we consider that the powerful pedipalpi typically reduce the prey to helplessness before it is even brought near the oral apparatus.

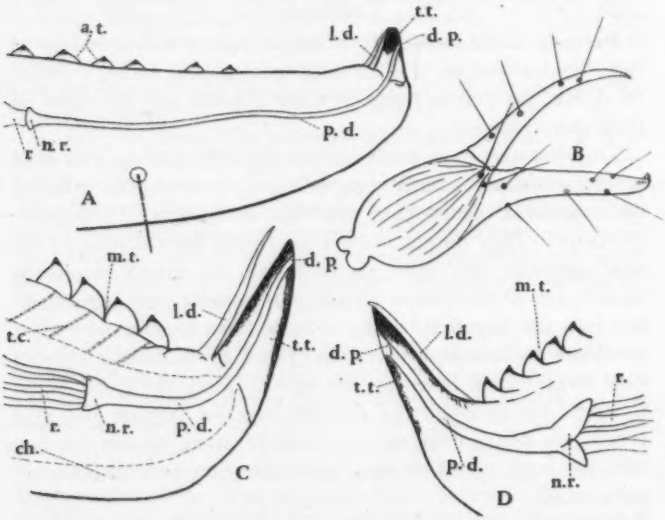
Then, as a final hypothesis, there is the possibility that the poison apparatus is situated at the tips of the fingers of the powerful chelate pedipalpi.

Consequently it is of more than ordinary interest to be able to report positive evidence of ducts debouching just at the point postulated by this third hypothesis.

A detailed description is unnecessary, the accompanying figures being self-explanatory. There are a number of points common to all types observed and these may be briefly noted.

The poison duct itself consists of a slender tube of variable length which debouches by means of a small pore situated on the outer curve of the terminal tooth of the finger, and just pos-

terior to its apex. Its posterior termination is a bulbous enlargement the *nodus ramosus*, from which posteriorly depart from one to four or five slender tubes, the *ramulus* or *ramuli*.



A—*Chelanops macrochelatus*, Tip of movable finger showing the poison apparatus of the Cheliferine type.

B—*Obisium carolinensis*, Lateral aspect of hand of pedipalpus showing diagrammatically the extent of the musculature and the arrangement of the tactile setae. Also the relative size and position of the poison ducts.

C—*Obisium carolinensis*, Tip of fixed finger showing the poison apparatus of the Obisiine type.

D—*Idcobisium* sp., Tip of fixed finger. Note peculiar modification of nodus ramosus.

Abbreviations: m. t.—marginal teeth; a. t.—accessory teeth; p. d.—poison duct; n. r.—nodus ramosus; r.—ramulus or ramuli; t. t.—terminal tooth; d. p.—debouchement of poison duct; l. d.—lamina defensor of terminal tooth; ch.—chitin; t. c.—"tooth canal," running to base of marginal tooth through chitin of finger.

These ramuli probably immediately enter, and are surrounded by glandular tissue, although this latter point is not certain. As shown in fig. B, the musculature leaves sufficient space for such tissue even allowing for the ectoderm and the considerable amount of nervous tissue necessary to supply the long tactile setæ and sense spots of the figures. An interesting structure is

found just posterior of the terminal tooth, which may possess some function in connection with the poison apparatus. This structure, which is here designated the *lamina defensor,* consists of a slender, translucent, blade-shaped process, usually a trifle longer than the terminal tooth and often closely appressed thereto.

The demonstration of the above described structures is very simple. Material which has been killed in alcohol and subsequently cleared in carbol-xylene shows them perfectly, without dissection of any sort.

They are definitely present in the Cheliferinæ and the Obisiidæ. My investigations are not complete but apparently they are absent in the Cheiridiinæ, the Garypidæ, the Feællidæ and the Chthoniidæ.

In the Obisiidæ (Figs. B, C & D) the poison duct is very short, the nodus ramosus being close to the terminal tooth, and the poison ducts occur only in the fixed finger of each hand. In the Cheliferinæ (Fig. A) the poison duct is elongate and the nodus ramosus is situated far from the posterior tooth, while the ducts occur in all four fingers.

There is no doubt about the presence of these ducts and, as a corollary, of the glands. The poisonous nature of their secretion then is the only questionable point and there are in the literature statements giving strong circumstantial evidence of its positive venomous character.

In the first place we have the observations of Bachausen. I quote verbatim the summary of these observations as given by Berger, 1905, pp. 412-413.

"Thus Prof. C. Berg reports that Bachausen in South America found a pseudoscorpion attached to the leg of a blow-fly and hanging free. He noticed after several hours that the legs of the fly became stiff. The next morning the fly was dead and the 'scorpion' sucked full under some scraps of paper. Bachausen next hungered a number upon moss under a glass and then gave them some small flies. The pseudoscorpions soon appeared and began to attach themselves to the legs of the flies by one pedipalp. . . . . The legs of the flies soon became stiffened and when the flies died they dragged them into concealment. A tabanus is reported as dying much slower than the other flies. On the other hand, Muhlhausen does not find that

the fly's leg was stiffened by a *Chelifer cancroides,* which held fast for fifty-six hours or until it was drowned in a drop of milk. Nor did the microscope show any evidence of injury to the fly's leg. It occurs to me, however, that *C. cancroides* is one of the smaller species and consequently was not able to injure the fly's leg as an individual of a larger species could have done."

As to the exception reported by Muhlhausen, *Chelifer cancroides* does possess the poison apparatus here described and I can only reiterate Berger's comment, that it was probably due to the fact that the animal was unable to penetrate the hard chitin of the fly's leg. This also shows that the tiring effect of the pseudoscorpion upon the fly is not sufficient to explain the early death of the flies reported by Bachausen. Certainly the poisoning effect seems to be a slow one, but nevertheless truly existent. It is impossible to imagine a mere mechanical injury to a fly's leg causing its death in a few hours.

A second bit of evidence as to their truly venomous nature is given to us by Emile André, one of the few observers to state a positive belief in the poisonous nature of these animals. In 1908 he reported the case of a woman of Geneva who was bitten three times by a specimen of *Chelifer cancroides*, twice on the thigh and once on the back. The animal itself was captured in this latter situation. The bite caused a sharp, though slight, transient pain. Later the injured spot gave rise to a small, bluish, red-centered swelling which was painful upon pressure and at a higher temperature than the surrounding skin. He adds that the patient had immediately bathed the injured part with "une solution de sublimé au millieme" and that it was possible that this had aggravated in some measure, the original injury. The first bites caused more severe pain than the last, probably on account of the diminished quantity of "saliva or venom" introduced into the wound.

The following paragraph is a free translation of his conclusions.

"Nevertheless it seems probable by reason of the above related facts, that a quantity of venom or saliva had been introduced into the little wound and for this reason we suppose that the chelicerae performed the function and not the palpi,

which as is generally known, do not possess a venomous apparatus. Furthermore it is probable that the chelicerae entered simultaneously and pinched the victim's skin."

While it is not impossible that some groups of the Pseudoscorpions (the non-galeate forms) could inflict a poisonous wound with the chelicerae, assuming the secretion of the silk glands to possess toxic properties in addition to their primary qualities, it would be impossible in those groups possessing chelicerae with a specialized spinneret or galea. In this connection it is interesting to note that the Chthoniidæ lack the galea and also the palpal poison apparatus and hence might well be studied with this possibility in mind. On the other hand the Obisiidæ which also lack the galea, possess the palpal poison apparatus in a well developed form. *Chelifer cancroides* being a galeate form is incapable of inflicting a poisonous injury with the chelicerae and hence André's suggestion must be ruled out, the more so, since we now know that the pedipalpi in this form *do* possess the means of inflicting the venomous wound.

In view of the above presented evidence it seems fairly certain that:

The Pseudoscorpions may or may not, depending upon the group, possess a well developed poison apparatus situated in two or all of the fingers of the pedipalpi, again depending upon the group under consideration. This conclusion is supported by definite and positive physiological evidence of a circumstantial nature. The situation and character of this poison apparatus is, so far as known, unique among the Arachnida and serves to further accentuate the isolated position already held by this order.

List of papers cited in the text and some others having a bearing on the venomous nature of the pseudoscorpions. I have not examined those marked with an asterisk.

1893—Berg, C. Pseudoscorpioniden kniffe. Zool. Anz. Bd. 16.

*1894—Muhlhausen, Hess. Ueber Pseudoscorpioniden als Ræuber. Zool. Anz. Bd. 17.

1905—Berger, E. W. Habits and Distribution of the Pseudoscorpionidæ, etc. (Cites Berg and Muhlhausen), Ohio Naturalist. Vol. 6; pp. 412-413.

1908—Andre, Emile. Sur la piqure des Cheliferes. Zool. Anz. Bd. 33, pp. 289-290.

*1909—Andre, Emile. Les Faux Scorpions et leur morsure. Geneve Bul. Inst. Nat. pp. 277-280.

The Muscoid Genus Genea in North America (Dipt.).

By J. M. ALDRICH, United States National Museum, Washington, D. C.

Rondani established the genus *Genea* in 1850 (Nuov. An. Sci. Nat. Bologna, ser. iii, vol. ii, p. 172), with the type and sole species *maculiventris,* new, from Venezuela. He dedicated it to "my very dear friend and master lately deceased, Professor Joseph Gené." The accent should be on the second syllable, and it might well have been spelled Genaea to bring this out. Rondani's description is masterly and sufficient, and, on account of its inaccessibility, I translate it entire from the Latin.

"Genus **GENEA** mihi.

Third and fourth veins of the wing reaching the costa separately, the fourth curved, not angulate, and thence arcuate outwardly; hind crossvein more distant from the anterior one than from the bend of fourth. Antennae of ordinary length, reaching almost to the epistoma, inserted on the front well above the middle of the eyes, the third joint three times the second. Arista a little tomentose or with very short pilosity, the second joint short but distinct. Eyes bare. Frontal bristles not continuing upon the face. Proboscis filiform, quite elongated. Palpi cylindrical and long, reaching to the middle of the proboscis and distinctly beyond the epistoma. Abdomen with only marginal macrochaetae, not provided with forceps or large and stout appendages nor curved under. See figures 4-5. Related to *Myobia* and *Fischeria.*

"Species **Genea maculiventris** mihi, Patria Venezuela. Length: 7 mm.

Male. First two antennal joints and base of third fulvescent, remainder of the third black. Arista very briefly pilose, black. Face a little whitish-sericeous. Front fulvescent, the bristles in two rows. Facial ridges with hardly a single bristle above the vibrissae; some bristles around the peristome; frontals hardly produced below the root of the antennae. Palpi and proboscis pale at base, the latter blackish apically, the former with small black hairs above and below. Thorax lutescent, middle of the dorsum black, pleura with a small blackish spot and others on pectus, metathorax blackish in middle. Scutellum lutescent. Abdomen lutescent, the second segment above with a triangular black spot behind, and a black dot at either side on the hind edge; third segment with a median black vitta dilated behind

and a small black spot on the hind edge at each side; fourth segment with two small lateral black spots behind. First abdominal segment without macrochaetae, second with two marginals, third and fourth with several marginals. Legs lutescent, tarsi black. Wings subhyaline; first longitudinal vein wholly setulose above, third setulose to the small crossvein."

The National Museum has a Brazilian specimen, female, one of the old H. H. Smith collection that was purchased by Dr. Williston and afterwards secured by the American Museum of Natural History, from which Townsend obtained it. The exact locality is "Piedro B."* It agrees perfectly with the description, and is very close to *texensis* Townsend. The black spots of the abdomen are smaller in all of our North American specimens except the one from Mexico, identified as *longipalpis* Van der Wulp, and we have none with the proboscis quite so elongated and slender, though the difference in this is not great. On the whole, after much consideration, I think it best to regard *texensis* and *longipalpis* as distinct species for the present, but further material may enable us to unite them with *maculiventris*.

In the table of Coquillett's Revision, *Genea* runs readily to *Leskiomima*, from which it separates by having long palpi; unless the proboscis is greatly retracted, the palpi project far beyond the epistoma in a very characteristic manner. Both *Leskiomima* and *Genea* have elongate form, yellow color, first vein hairy, arista pubescent, ocellar bristles small to minute and identical chaetotaxy. *Leskiomima* has but one described species, *tenera*. In this the male has long claws and pulvilli, and has no orbitals.

Genea has perhaps four species, but two may be synonyms. Besides the type species already noted these are the following:

Genea analis Say.

Dexia analis Say, Jour. Acad. Nat. Sci. Phil., vi, 1829, 177; Comp. Works, ii, 367.

Leskiomima tenera Wiedemann (in part), Coquillett, Revis. Tachin., 1897, 67 (the specimen from Chester Co., Pa.).

[* Possibly Piedra Blanca, Bolivia, four miles west of Corumbá, Brazil. H. H. Smith, quoted in Ann. Carnegie Museum, Pittsburgh, vi, p. 77. 1909.—Ed.]

Say's description being readily accessible, I will merely state that his specimen was a yellow fly 8.75 mm. long, evidently with the arista at least pubescent or he would not have called it *Dexia,* and he adds the important note, "The proboscis and palpi are much elongated."

Coquillet misidentified the species in his Revision and made it out the same as his own *Myobia depile,* there referred to the genus *Leskia,* while he placed a female belonging to *analis* in his lot of *Leskiomima tenera,* along with two specimens of the species later described as *texensis. Analis* in this mistaken sense was split up by Townsend into *Myobiopsis similis* and *Leskiopalpus calidus* (Proc. U. S. N. M., vol. 49, 1916, 628, 629); the latter of these is a synonym of *depile* Coquillett, as pointed out by Smith in Proc. Ent. Soc. Wash., xix, 1917, 125. All this, however, has nothing to do with the true *analis* as I make it out.

The National Museum contains the following material assigned by me to this species:

One male, Chain Bridge, Virginia, VIII, 3, 1923 (Aldrich); one female, same place and collector, VI, 25, 1923; one female, Great Falls, Virginia; IX, 20, 1917 (C. T. Greene); one female, Plummer's Island, Maryland, IX, 29, 1912 (P. R. Myers); one female, same, VIII, 5, 1914 (Shannon); one female, same, VIII, 18, 1912 (Malloch); one female, Chain Bridge, Virginia, on *Ceanothus,* VI, 23, 1916 (Greene); one female, Chester County, Pennsylvania, VIII, 25, 1895 (C. W. Johnson); and one female, Lafayette, Indiana, IX, 9, 1916 (Aldrich).

The differences between this and *texensis* are discussed below.

Genea texensis Townsend.

Dejeaniopalpus texensis Townsend, Proc. U. S. N. M., Vol. 51, 1916, 312.

Leskiomima tenera Wiedemann (in part), Coquillett, Revis. Tachin., 1897, 67 (the two specimens from New York City).

Townsend described the species from a single female labeled "Tex.," failing to observe two more specimens among Coquillett's set of *Leskiomima tenera.* The following material assigned by me to this species is in the National Museum:

One male, Virginia across the river from Washington, bred

by Pergande (No. 3661) from a Lepidopterous larva sp. (*Botys* sp.) which "curiously rolls up the terminal leaves of a fern into a perfect ball," VII, 3, 1885; one female, Texas, type of the species; two females, New York City, VIII, 8, 1890 (E. B. Southwick); one female, Pocono Lake, Pennsylvania, VII, 11, 1911 (Greene, in the Walton coll.); and one female, Ithaca, New York (Banks).

It will be observed that we have a single male of *analis* and the same of *texensis*. The capture of the male of *analis*, on Aug. 3, 1923, absolutely ruined the first draft of the present paper, which was committed to a single North American species of *Genea*, at least in the United States. This male proved conclusively that the material must be distributed between two species, a fact which could not be established from females alone.

The two males differ in the following characters:

That of *analis* is larger (8.75 mm., exactly as given by Say); its front is .23 of the headwidth by micrometer, and has no orbitals; the claws and pulvilli are long on all the tarsi; the width of the third antennal joint is 5 and the length 15 by micrometer.

The male of *texensis* is smaller (6.5 mm.); the front is .30 of the headwidth, and has two pairs of orbitals; the claws and pulvilli are all small; the width of the third antennal joint is 6 and the length 13 by micrometer.

I can make out no other differences of any significance at all. The ones noted are sexual characters and would not show in the female, except size and the shape of the third antennal joint. Size of course is variable and may mislead; the three females first mentioned under *analis* are large like the male, all the rest smaller and agreeing in this respect with *texensis*. I have depended most on the shape of the third antennal joint for placing the females; some agree with the respective males so as to leave little doubt of their relations, but several are intermediate and I am not quite sure to which they belong.

Rondani's statement that the frontals are in two rows in his male shows that orbitals were present, and his species is more nearly related to *texensis* than to *analis*.

Genea longipalpis Van der Wulp.

Myobia longipalpis Van der Wulp, Biologia, Dipt., II, 1890, 138.

A female identified as this by Townsend is in the National Museum. He placed it naturally under his *Dejeaniopalpus*. It is from San Rafael, Vera Cruz, Mexico, Mar. 8 (Townsend). It has a slightly shorter proboscis than our female of *maculiventris*, but is probably the same species. It seems prudent to see the male before definitely dropping the name into synonymy. Both of these specimens have a large, triangular median black spot on both second and third segment, the apex of the spot reaching to the front edge of the segment.

Obviously the genus *Dejeaniopalpus*, type *texensis*, is a synonym of *Genea*.

Brauer and Bergenstamm seem to be in error (Zweifl. Kais. Mus., VI, 1893, 132) in making *Spathipalpus* Rondani (type *philippii* Rondani from Chile), a synonym of *Genea*. The Chilean species has the frontals extending upon the face, according to the description, and the palpi are spatulate. It is a black species, and may be a Dejeaniine with hairy first vein.

On the Identity of the Genus Ernestia R. D. (Tachinidae, Dipt.).*

By C. Howard Curran, Ottawa, Ontario.

In his "Revision of the Nearctic Species of the Tachinid Genus *Ernestia* R. D." (Can. Ent., Sept. 1921, p. 199 etc.), Dr. J. D. Tothill pointed out certain characters separating the various groups which he included under this genus. The chief characters of the subgenus *Meriana*, as outlined by him in the revision, were the absence of discal macrochaetae on the second abdominal segment and hairy parafacials. Neither of these characters can be regarded as of generic value in most cases, and they were not so considered by Tothill. Perhaps the most significant statement, from a generic standpoint, is the indication

* Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

of primitive posterior (inner of Tothill) claspers, as these possess no "keel" in *Meriana*. The type species of *Ernestia* (*E. rudis* Fallen) has the same type of genitalia, while the majority of the species enumerated by Tothill have the posterior claspers more or less strongly keel-shaped.

A study of species treated by Tothill proves that there are two very easily separated genera which may be distinguished as follows:

The genus *Ernestia ss.* is devoid of a group of fine hairs on the metanotal slopes immediately below the inner base of the squamae, and the posterior forceps are normally simple.

The genus *Mericia* R. D. (the species not included above) possess a group of fine hairs on the metanotal slopes immediately below the inner base of the squamae; posterior genital forceps usually carinate.

It is quite evident that the species placed in the sub-genus *Meriana* really belong to the genus *Ernestia*, while practically all those considered under the subgenus *Ernestia* belong to the genus *Mericia* as limited above.

The genus *Ernestia* therefore includes, as far as I am acquainted with them, the following species, *rudis* Fall. (type), *radicum* Mg., *flavicornis* Br., *chalybea* Coq.? and *nigrocornea* Coq.?

Mericia includes those species listed by Tothill on p. 203, of the *Canadian Entomologist* for September, 1921, under the subgenus *Ernestia*.

The genus *Meriana* is therefore a synonym of *Ernestia*. *Metaphyto* is evidently not separable from *Ernestia* and should be considered a synonym. By the use of the character indicated as separating *Mericia* and *Ernestia* we are able to definitely isolate the former from other allied genera, this undoubtedly being a step in the right direction in the classification of this difficult group.

While dealing with the subject, I wish to point out that the genus *Bombyliomyia* has the lower squamae long pilose above, a character I have not noted in other genera.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., JUNE, 1924.

The Ages of Some Existing Entomological Journals.

A writer in the business and financial section of *The Public Ledger* (Philadelphia) for April 19, 1924, said:

Fifty years is a variable quantity. It is the major part of a man's life, an era for a nation, a passing moment in geology. For a magazine it is a ripe and venerable age. Few technical journals have reached it. Engineering News-Record reached that age this week.

This remark reminded us that the present year is witnessing the fiftieth volume of the *Transactions of the American Entomological Society*. The American Entomological Society is the metamorphosed Entomological Society of Philadelphia, organized February 22, 1859, incorporated in April, 1862, the name changed in February, 1867. Under its original name, the Society published six volumes of the *Proceedings of the Entomological Society of Philadelphia* from 1861 to 1867. With the change in its title, the first volume of the *Transactions* was begun in June, 1867, so that with the fiftieth volume appearing in 1924, the number of volumes is seven less than the number of years (57) during which the series has been appearing, a correspondence of years with volumes not obtaining in the earlier years. One member of the original Publication Committee of 1861 is still a member of that committee to-day—the founder of the Society, the veteran hymenopterologist, Ezra Townsend Cresson.

The *Proceedings-Transactions* is the oldest existing purely entomological journal in the Americas to-day. Next in chronological order come The Canadian Entomologist, 56 volumes, begun in 1868; the 53 Annual Reports of the Entomological Society of Ontario (the first in 1871); Psyche, 31 volumes, begun in 1874; Bulletin of the Brooklyn Entomological Society, 19 volumes, 1878-1885, 1912 on; Proceedings of the Entomological Society of Washington, 26 volumes, begun in 1884; Journal of the New York Entomological Society, 32 volumes, begun in 1893; Journal of Economic Entomology and Annals of the Entomological Society of America, each 17 volumes, both begun in 1908.

It may be of interest to contrast these with the dates of commencement of the older, existing, or recently existing, European entomological journals, as given by Mr. Banks, in Bulletin 81 of the Bureau of Entomology, U. S. Dept. of Agriculture (1910), but here arranged chronologically:

1832. Annales, Société Entomologique de France, Paris.
1835. Transactions, Entomological Society of London.
1840. Entomologische Zeitung, Stettin.
1857. Berliner Entomologische Zeitung.
1858. Tijdschrift voor Entomologie, The Hague.
1860. Annales, Société Entomologique de Belgique, Brussels.
1861. Horae Societatis Entomologicae Rossicae, Petrograd.
1864. Entomologists' Monthly Magazine, London.
1864. The Entomologist, London.
1865. Mitteilungen der schweizerischen entomologischen Gesellschaft, Berne.
1869. Bolletino della Societá Entomologica Italiana, Florence.
1880. Entomologisk Tijdskrift, Stockholm.
1881. Deutsche Entomologische Zeitschrift, Berlin.
1882. Revue d'Entomologie, Caen.
1882. Wiener Entomologische Zeitung.

The Occurrence of an Important European Parasite in North America (Hymen.: Elachertidae).

While attempting to follow the life history of the spotted cut-worm (*Agrotis c-nigrum* L.) on the cranberry, the writer encountered several parasitic insects. Specimens of some hymenopterous parasites were sent to Dr. L. O. Howard for identification, and were turned over by him to Mr. A. B. Gahan. Mr. Gahan's final determination brought to light the first record of *Euplectrus bicolor* Swederus (Elachertidae) in this country. The specimens were reared by the writer from a loose, matted mass of silken filaments surrounding a dead larva of *Agrotis c-nigrum*. The larva and the cocoon-like structure were found on a cranberry bog which was heavily infested with spotted cutworm larvae in the town of Kingston, Massachusetts, during the latter part of July, 1923. The adults emerged July 26, 1923. Dr. Howard states that this is an important parasite of cutworms in France and Italy, and that no record of its appearance in North America has heretofore been established.—DON S. LACROIX, Amherst, Massachusetts.

Entomological Literature

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

Papers of systematic nature will be found in the paragraph at the end of their respective orders. Those containing descriptions of new genera and species occurring north of Mexico are preceded by an *.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

The titles occurring in the Entomological News are not listed.

1—Proceedings of the Academy of Natural Sciences of Philadelphia. **7**—Annals of the Entomological Society of America, Columbus, Ohio. **10**—Proceedings of the Entomological Society of Washington, D. C. **14**—Proceedings of the Zoological Society of London. **20**—Bulletin de la Societe Entomologique de France, Paris. **22**—Bulletin of Entomological Research, London. **24**—Annales de la Societe Entomologique de France, Paris. **36**—Transactions of the Entomological Society of London. **41**—Bulletin de la Societe Entomologique Suisse, Bern. **61**—Proceedings of the California Academy of Sciences, San Francisco. **64**—Parasitology, London. **68**—Science, Garrison on the Hudson, N. Y. **69**—Comptes Rendus, des Seances de l'Academie des Sciences, Paris. **77**—Comptes Rendus des Seances de la Societe de Biologie, Paris. **82**—The Ohio Journal of Science, Columbus. **89**—Zoologische Jahrbucher Jena. **95**—Annales des Sciences Naturelles, Zoologie, Paris. **100**—Biological Bulletin of the Marine Biological Laboratory, Woods Hole, Mass. **104**—Zeitschrift fur Wissenschaftliche Zoologie, Leipzig. **114**—Entomologische Rundschau, Stuttgart. **115**—Societas Entomologica, Stuttgart. **138**—American Museum Novitates, New York. **141**—Internationale Entomologische Zeitschrift, Guben. **143**—Stettiner Entomologische Zeitung.

GENERAL. Arnold, J.—Grau ist alle theorie. **141,** xviii, 11-12. **Binder, und Haase.**—Vom sammler zum lokalfaunisten. **141,** xviii, 2-3. **Cornetz, V.**—Les insectes paralyseurs (La Nature, Paris, 1924, 252-54). **Sherborn, C. D.**—Index animalium, Sec. 2, Pts., II-III, Aff-Bail. **Weiss, H. B.**—Insect food habits and vegetation. **82,** xxiv, 100-6.

ANATOMY, PHYSIOLOGY, MEDICAL, ETC. Cleveland, L. R.—The physiological and symbiotic relationships between the intestinal protozoa of termites and their host. . . **100,** xlvi, 203-27. **Feuerborn, H. J.**—Der dipterenflugel nicht meso—, sondern metathoracal? Eine neue morphogenetische deutung des dipterenthorax. **89,** xlii, Anat., 529-46. **Gadeau de Kerville, H.**—Consequences de la ligature de la tete, avec ou sans decapitation, chez les vers a soie du murier (Sericaria mori) au moment de la nymphose. **20,** 1924, 69-70. **de Gedroyc, M.**—L'influence de lymphe des insectes sur le microbe de la race. **77,** XC, 906-7. **Noskiewicz et Poluszynski**—Un nouveau cas de polyembryonie chez les insectes (Strepsipteres). **77,** xc, 896-8. **Uichanco, L. B.**—Studies on the embryogeny and postnatal development of the Aphididae with special reference to the history of "symbiotic organ" or "mycetom" (Phil. Jour. Sci., xxiv, 143-247). **Zawarzin, A.**—Ueber die histologische beschaffenheit des unpaaren ventralen nervus der insekten. **104,** cxxii, 97-115.

ARACHNIDA AND MYRIOPODA. *Chamberlain, R. V.—The spider fauna of the shores and islands of the Gulf of California. **61,** xii, 561-694. **Hirst, S.**—On some new or little-known species of Acari. **14,** 1923, 971-1000.

THE SMALLER ORDERS OF INSECTA. Krafka, J.—Morphology of the prolegs of trichopterous larvae. **7,** xvii, 97-105. **Mosely, M. E.**—Scent organs in the genus Hydroptila (Trichoptera). **36,** 1923, 291-4. **Philpott, A.**—(See under Lepidoptera). **Vogel R.**—Zur .kenntnis des baues und der funktion des stachels und des vorderdarmes der kleiderlaus (Pediculus vestimenti). **89,** xlii, Anat., 229-58.

***Folsom, J. W.**—New sps. of Collembola from New York State. **138,** No. 108.

ORTHOPTERA. Bugnion, E.—Mantes et Empuses. Essais d'elevarage appareil de la femelle. Confection de l'ootheque. Eclosion des jeunes larves. (Mem. Soc. Vaud. Sci. Nat., 1923, 177-243.) **Plotnikov, V. I.**—Some observations on the variability of Locusta migratoria, in breeding experiments. **22,** xiv, 241-3.

HEMIPTERA. Holland, W. J.—The family name of the lace-bugs (Tingitidae). **7,** xvii, 95-6.

***Bergroth, E.**—On the Isometopidae of No. Am. **143,** iv. 3-9. **Bruner, S. C.**—Una nueva especie de la familia Enico-

cephalidae. (Mem. Soc. Cubana Hist. Nat. F. Poey, vi, 53-9.) ***Gillette & Palmer**—New Colorado Lachnini. **7,** xvii, 1-58. ***McAtee, W. L.**—Notes on the genus Dikraneura in the U. S. (Eupterygidae). **10,** xxvi, 75-6. **Silvestri, F.**—Descripcion de un nuevo genero y tres especies nuevas de Ortheziinae de Espana y de Costa Rica. (Coccidae.) (Bul. R. Soc. Espanola Hist. Nat., xxiv, 169-76.)

LEPIDOPTERA. Eltringham, H.—On the tympanic organ in Chrysiridia ripheus. **36,** 1923, 443-58. **Hock, K.**—Ueber aberrationen bei schmetterlingen. **114,** xli, 13-4. **Ishimori, N.**—Distribution of the malpighian vessels in the rectum of lepidopterous larvae. **7,** xvii, 75-86. **Philpott, A.**—The genitalia in Sabatinca and allied genera with some observations on the same structures in the Mecoptera. **36,** 1923, 347-66. **Rangnow, H.**—Beitrage zur symbiose zwischen Lycaeniden und Ameisen. **141,** xviii, 10-11.

Clark B. P.—Twelve new Sphingidae. (Proc. N. Engl. Zool. Club, ix, 11-21.) **Ford, E. B.**—The geographical races of Heodes phlaeas. **36,** 1923, 692-743. **Oberthur, C.**—Le genre Agrias. (Etud. Lep. Comp. Fasc. xxii, 11-84.) **Skinner & Ramsden**—Annotated list of the Hesperiidae of Cuba. **1,** lxxv, 307-21,

DIPTERA. Frew, J. G. H.—On the larval anatomy of the gout-fly of barley (Chlorops taeniopus) and two related muscids, with notes on their winter host-plants. **14,** 1923, 783-822. **Keilin, D.**—On the life history of Anthomyia procellaris, and A. pluvialis, inhabiting the nests of birds. **64,** xvi, 150-9. **Mercier, L.**—Malformations produites chez une mouche (Calliphora erythrocephala) par l'action des vapeurs de naphtaline; reapparition des anomalies dans une seconde generation elevee dans des conditions normales. **69,** clxxviii, 1326-9. **Saunders, L. G.**—On the life history and the anatomy of the early stages of Forcipomyia (Ceratopogoninae). **64,** xvi, 164-213. **Verhein, A.**—Die eibildung der Musciden. **89,** xlii, Anat., 149-212. **Vogel, R.**—Kritische und organzende mitteilungen zur anatomie des stechapparats der Culiciden und Tabaniden. **89,** xlii, Anat., 259-81.

Borgmeier, T.—Drei neue Phoriden aus Brasilien. **115,** 13-15. **Malloch, J. R.**—A new species of Conicera from Porto Rico (Phoridae). A new gen. and sp. of Muscidae. **10,** xxvi, 73; 74. ***Spuler, A.**—North American genera and

subgenera of dipterous family Borboridae. **1,** lxxv, 369-78. ***Spuler, A.**—Species of subgenera Collinella and Leptocera of N. Am. **7,** xvii, 106-17.

COLEOPTERA. Bertrand, H.—Eclosion de l'oeuf de quelques Chrysomelides. **20,** 1924, 54-7. **Bertrand, H.**—Larve et nymphe d'Haliplus lineaticollis. Anomalies chez des larves et nymphes de coleopteres. **24,** xcii, 323-38; 339-44. **Scott, H. M.**—Observations on the habits and life history of Gallerucella nymphaeae. (Tr. Am. Micro. Soc., xliii, 11-16.) **Van Vleck, H.**—The flashing of fireflies. **68,** lix, 379.

Horn, W.—Zur systematik, geographic, und lebensweise der Cicindelinae. **89,** xlviii, Syst., 309-30. ***Mann, W. M.**—Myrmecophiles from the western U. S. and Lower California. **7,** xvii, 87-95. **Maulik, S.**—A new hispid beetle injurious to oil palms in Brazil. **22,** xiv, 245-6. **Mutchler, A. J.**—A new sp. of Cicindelidae from Cuba. **138,** No. 106. **Reichensperger, A.**—Neue sudamerikanische Histeriden als gaste von wanderameisen und termiten. **41,** xiii, 313-36.

HYMENOPTERA. Barbey et Ferriere—Un cas interessante de parasitologie dans l'ecorce du pin sylvestre. (Bul. Soc. Vaud. Sci. Nat., lv, 77-81.) **Bugnion, E.**—Les organes buccaux de la scolie (Scolia bifasciata). **41,** xiii, 285-313. **Peacock, A. D.**—On the males and an intersex-like specimen of the parthenogenetic saw-fly, Pristiphora pallipes. (Brit. Jour. Exper. Biol., i, 391-412.) **Pham-tu-thien**—Sur le regime alimentaire d'une espece de fourmis indochinoises (Pheidologeton diversus). **95,** vii, 131-35. **Santschi, F.**—L'orientation siderale des fourmis, . . . (Mem. Soc. Vaud. Sci. Nat., 1923, 137-75.) **Seyrig, A.**—Accouplement des ichneumons. Observations sur la biologie des ichneumons. **24,** xcii, 300; 345-62.

***Cockerell, T. D. A.**—Notes on the structure of bees. **10,** xxvi, 77-85.

SPECIAL NOTICES

Genera insectorum, Fasc. 172, 1918, Coleoptera, Fam. Niponiidae, von H. Bickhardt. A copy of this suppressed fascicle has come to our notice. It contains 4 pp. and 1 col. plate. The family is represented by species from the oriental region only, but we think a notice of this part would be of interest.

Doings of Societies.

The American Entomological Society.

Meeting of October 25, 1923, Dr. Henry Skinner presiding, twelve persons present.

The Publication Committee reported papers accepted for publication by Messrs. Hebard, Blaisdell and Rehn.

The Property Committee reported the following additions to the library:

"Le Monde Social des Fourmis," by A. Forel, 3 Parts.

"The Structure and Life History of the Cockroach," by Miall & Denny.

"Les Larves et Nymphes Aquatiques des Insectes d'Europe," by E. Rousseau.

"Pterophoridae of California and Oregon," by Lord Walsingham.

It was moved and carried that a committee of three be appointed by the President to consider the advisability of continuing the meetings of the Society through the year, conferring with the committee of the section on a similar subject.

There was discussion on the advisability of changing the time of calling the meetings from 8 o'clock to 7 or 7:30 o'clock. No action was taken, but it was to be considered again at a future meeting.

Dr. Skinner announced the death of Nathaniel C. Rothschild, speaking of his entomological career and his own personal recollections of his visit to Rothschild when in Europe. It was moved and carried that a letter of explanation be sent with his certificate of election as a Corresponding Member, to his family.

All of the nominees for Corresponding Membership of the Society, whose names were offered at the previous meeting, were unanimously elected.

LEPIDOPTERA.—Mr. Hornig stated that some cocoons of Cynthia moths, which he had collected in 1921 and had remained in a drawer, still contained live chrysalids. He also exhibited and presented to the Society prepared life histories of the southern butterfly *Calpodes ethlius* and the Florida fern caterpillar. Mr. Bayliss reported *Apatura clyton* common at Stroudsburg, Pennsylvania, about July 2, and mention was made by Dr. Skinner and Mr. Laurent of its occasional appearance in Philadelphia. Mr. Williams exhibited specimens of *Choranthus radians* and *hataiensis* and remarks were made by Dr. Skinner and Mr. Rehn on the distribution of the butterflies and other insects of the Antilles. Dr. Skinner exhibited boxes of moths of the genus

Automeris, many of which were collected by Mr. Huber in Nicaragua on his recent trip.

COLEOPTERA.—Mr. Cresson reported that *Phytonomus punctatus* F., the clover leaf beetle, was found August 30 in great numbers crawling along the curb of the Parkway, near the Academy. Were these injuring any other plant than clover? According to Smith, the beetle is full grown in May. Mr. Godine spoke of the French beetle with green and gold thorax, calling attention to the constancy in the percentage of the color varieties.

Annual meeting of December 10, 1923. Dr. Henry Skinner, President, in the chair, and ten members and visitors present.

Reports of the Treasurer, Publication Committee and Committee on Property were presented.

The Committee on Modification of the By-Laws reported as follows: That the meetings of the Society and of the Section be called at 7:30 P. M. instead of 8:00 P. M., and that the present agreement with the Academy be modified by striking out paragraph 5, so that a person may become a member of the Society who is not a member of the Academy.

It was moved that meetings for 1924 be held on the fourth Thursday of February, April and October and the second Monday of December.

Mr. Cresson added to the report of the Property Committee the receipt of photographs of Philip Nell and R. C. Williams, Jr., and the following additions to the cabinet: 4 paratypes *Cyrtopogon tacoma* Mel., 2 paratypes *Cyrtopogon aldrichi* Mel., 4 topotypes *Melandrea mandibulata* Ald. from A. L. Melander; 1 ♂ 1 ♀ *Panorpa nuptialis* Gers., Texas, from R. H. Painter.

Mr. Rehn moved that $50.00 be transferred from the general funds to the *Entomological News*. This motion was carried.

The following officers and committee members were nominated for 1924:

President, Henry Skinner; *Vice-President*, J. A. G. Rehn; *Corresponding Secretary*, Morgan Hebard; *Recording Secretary*, R. C. Williams, Jr.; *Treasurer*, E. T. Cresson; *Publication Committee*, J. A. G. Rehn, *Chairman*, E. T. Cresson, P. P. Calvert; *Finance Committee*, Morgan Hebard, *Chairman*, D. M. Castle, J. A. G. Rehn; *Property Committee*, E. T. Cresson, Jr., *Chairman*, Morgan Hebard, Philip Laurent.

In each case the nominations were closed and on motion the Secretary cast a ballot and the above Officers and Committees were elected.

R. C. WILLIAMS, JR., *Recording Secretary.*

OBITUARY.

Alexander Dyer MacGillivray.

On March 24, 1924, Alexander Dyer MacGillivray, one of the most outstanding of present-day teachers of Entomology in America, passed to the Great Beyond. Although there had been repeated warnings that he was overtaxing himself, and he was never robust, his death came as a great shock to most of those who knew him. I last saw him at the Cincinnati Meetings in December, and found him full of plans for the future and insistent that he was feeling much better than he had before in recent years. It was very apparent then that he was far from well, but we had seen his rebound from similar conditions and did not realize that the end was near.

Dr. MacGillivray was born July 15, 1868, at Inverness, Ohio. He entered upon his undergraduate work at Cornell University in 1889 and developed an intensive interest in Entomology. With characteristic singleness of purpose, he turned to this study, which was destined to be his life work, and neglected some of the formal requirements of the undergraduate course. He registered sporadically and followed much his own bent in his work. The result was that when I first came to know him in the fall of 1898 he was technically still classed as a sophomore, although, apart from Slingerland, who gave a brief course in Economic Entomology, he was Professor Comstock's sole assistant in the strenuous teaching work of the Cornell Department of Entomology.

He came to see that he was making a mistake in neglecting his undergraduate work and, with that indomitable will which he possessed, he set about to meet the requirements which were before him. German had always been a bugbear to him and after my first semester, for nearly a year we spent three or more nights a week reading Van Rees, Kowalevsky, and some of the other great classics on metamorphosis. French he found easier, and not long after when his interest in Coccidae developed, he took up and mastered the Italian. I mention these merely to show the strength of his determination,—he often spoke of it himself as his "Scotch stubbornness."

In 1900 he took his Ph.B. degree and in 1904 his Ph.D. From 1900 to 1906 he was Instructor in Entomology and

General Invertebrate Zoology, and from 1906 Assistant Professor at Cornell. In 1911 he severed his connection of twenty-three years with Cornell University and took up work as Assistant Professor of Systematic Entomology at the University of Illinois. In 1913 he was made Associate Professor, and in 1917 he was advanced to a full professorship in Entomology, the position which he held at his death.

His doctorate thesis was *A Study of the Wings of the Tenthredinoidea, a Subfamily of Hymenoptera.* Aside from the collaborated work of Comstock and Needham, this intensive study was the most important of the earlier efforts to elaborate and apply to other orders the principles laid down by Professor Comstock in 1893, when he made his epochal studies of the wings of the Lepidoptera. Using a wealth of material, MacGillivray attempted "to trace the course of the changes wrought by natural selection" and "to apply the principles of descent to taxonomy." He was much interested in the consideration of the dynamical control of wing type, developing especially the thesis that "That wing is the most perfect mechanical device which approaches the closest to some type of truss."

A list of the published papers by Dr. MacGillivray includes eighty titles. It begins with a bibliographic catalogue of the Thysanura of North America, published in 1891, in the Canadian Entomologist. This was followed by a series of five papers under the general title, *North American Thysanura,* reviewing the groups and describing thirteen new species.

In 1893 appeared his first paper on the saw flies, a group which was to claim his chief attention throughout life. In this paper he lists thirty species of Tenthredinidae and Uroceridae from Olympia, Washington, fourteen of which were described as new to science. Something over 400 new species of Tenthredinoidea were described by him before he laid down his work. His most comprehensive study was that on the Tenthredinoidea of Connecticut, a contribution of 190 pages, published in the Bulletin of the Geological and Natural History Survey of Connecticut, in 1916.

His interest in the saw flies was not limited to mere species description, but he had done much upon the immature stages

of these forms, and had published several preliminary papers dealing with this phase of the subject. The greater part of it is included in a bulky manuscript on "Immature Stages of Insects." This work was projected as far back as 1903, when he published in the Bulletin of the New York State Museum his paper on *Aquatic Chrysomelidae, and a Table of the Families of Coleopterous Larvae.* He had brought together a wealth of new material which it is hoped can still be made available for publication.

About 1904, Dr. MacGillivray first offered a formal course on the anatomy and taxonomy of the Coccidae. Entering upon the work with his usual thoroughness and zeal, he soon prepared an extensive series of mimeographed notes which were distributed and a source of aid and stimulus not only to a considerable group of his own students but to a number of outside workers. In 1921 this material was finally brought together in book form under the title, *The Coccidae: Tables for the Identification of the Subfamilies and Some of the More Important Genera and Species together with Discussions of their Anatomy and Life History.*

This work upon the Coccidae has been harshly criticized and undoubtedly it contains much that is not acceptable to other specialists. Dr. MacGillivray was a man of pronounced views and he did not hesitate to put them forth. After careful study of a group he was prone to rearrange and revise it to meet his own ideas, and he was never chary in creating new generic and group names. To those knowing his long interest in the scale insects and his painstaking methods of work, the implication that the text was mainly compilation and that his acquaintance with the insects themselves was limited, seems wide of the mark, however debatable the opinions expressed may be.

In 1923, only a few weeks before the author's untimely death, appeared his *External Insect Anatomy, a Guide to the Study of Insect Anatomy and an Introduction to Systematic Entomology.* In many respects this is to be regarded as his most important published work. With a background of over thirty years of systematic work and a remarkably broad knowledge of insect groups, this little book presents a fund

of information which will be more and more appreciated as it is studied intensively. Unfortunately, it is cumbered by a nomenclature and a phraseology which is certain to prove irritating and which is likely to repel the casual student.

In neither it nor the coccid book is any attempt made to put the material in attractive form. Dr. MacGillivray had no patience with a prevalent viewpoint that work must be sugar-coated in order to justify itself. A favorite expression of his was that of "holding the student's nose to the grindstone." He attracted few general students and he held few supposedly interested in specializing who were not willing to pay the price.

This attitude is well illustrated by a typical statement in the preface to the coccid book:

"The fact that no figures are included in this Volume may appear to many as an error. The tables were prepared primarily for the use of students. Those who have had any experience in teaching know that most students will not undertake anything they are not forced to do. The omission of figures makes it necessary for them to study their specimens rather than figures."

More than one reader of this sketch will recall specific and personal experiences with this same viewpoint. For the purpose of orienting the graduate student in the departmental work, it was Professor Comstock's practice to require all entering upon the laboratory work to take the elementary course in morphology and wing venation. This course was MacGillivray's delight. He was no respecter of persons, unless it was to the extent that the teacher of years of experience and possibly a wide general acquaintance with the field of entomology, was likely to have the screws turned on him even more tightly than on the veriest tyro among the undergraduates. How some of them did rage and what indignation meetings were held over some insistence upon detail or upon conformity to what seemed a perfectly arbitrary requirement! And yet, wherever those men met in after years they delighted to recount these experiences and would close with the declaration that it was the most valuable drill which they had ever had in their biological work.

But those who were privileged to really know him, knew full well that this represented only one side of the man. Sen-

sitive to a degree, he valued friends and friendship to an extent that many did not realize. He was keenly interested in his students personally and his home was always open to them.

His love for children and his interest in them was a characteristic which was known to all of his close friends. Even to many of those who knew him intimately it will be a surprise to learn that among his cherished plans was the publication of a book of "Insect Stories" for children, and that a considerable amount of work had been done upon it.

Dr. MacGillivray was a member of the various technical societies in the field of zoology, but it was to the Entomological Society of America, during its earlier years, that he gave unstinted service. A charter member, he was second vice-president in 1911 and from 1911 to 1916 he served most faithfully and efficiently as secretary-treasurer. In recent years, owing largely to ill-health, he was seldom seen at the annual meetings.

During his days as a graduate student at Cornell he was one of the organizers and active supporters of a Biological Club which was almost a fraternity in its careful selection of members and in the *esprit de corps* which it developed among the chosen graduate students and the younger instructors. To MacGillivray its meetings were a delight, and filled much the same place as does a club for some men. In later years he derived especial pleasure from his membership in the Gamma Alpha Graduate Scientific Fraternity, because of the opportunity it afforded him for informal social contact with the younger men in the scientific field. To an extent unusual for the older men, he retained this contact and an active interest in the welfare of the society and its members.

In the passing of Dr. MacGillivray, the science of entomology loses a unique and an outstanding disciple. A large number of students who have come under his influence, and others who have been associated with him mourn the loss of a stimulating and valued helper and a true friend. WM. A. RILEY.

CORRECTION

Page 169, lines 5 and 12, for *Calochartus*, read *Calochortus*. Page 170, line 23, for *Betheliella calocharti* new species read *Betheliella calochorti* new species.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

Wanted in exchange or cash 1000 Precis orithya ♂, Precis isocratia ♂, Precis mevaria ♂. A. F. Porter, 104 W. Broadway, Decorah, Iowa.

Cynipidae. Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

Wanted—Saturnioidea and their living pupae, especially io, luna and Anisota. D. M. Bates, Agric. Exp. Sta., Gainesville, Fla.

For Exchange.—Living pupae of Automeris io and Papilio asterias and unnamed coleoptera from India for Catocalae or N. A. coleoptera. Mrs. Robert Milde, Lewiston, Minnesota.

For Exchange.—I have for exchange live pupae of Sphinx Chersis, for other pupae or Lepidoptera in papers, Southern specimens. V. Tykal, 2412 S. Harding Ave., Chicago, Ill.

Will pay cash for specimens of rare and unusual **Scarabaeidae** (named—Leng's Catalogue). Send list and prices to Wm. C. Wood, 51 Fifth Ave., New York, N. Y.

Wanted—Psyche, Vols. I, XI, XIII, and Bulletin, Brooklyn Entomological Society, Vols. I, II, III. H. C. Severin, State Entomologist, Brookings, South Dakota.

I have living pupae of io, imperialis, regalis and others, also caterpillars of Eupantheria deflorata and spp. of Coleoptera for exchange. Address V. Harnach, 47 West College St., Asheville, N. C.

Correspondence invited from all those interested in Hungarian insects; Coleopt., Lepidopt., Hymenopt., Hemipt., etc.—Prof. Charles Sajo, Oerszentmiklos, (Komitat Pest) Hungary.

Will exchange lepidoptera of Pennsylvania for those from other parts of the continent. Frank H. Chermock, 1308 Tell Street, N. S., Pittsburgh, Pa.

Wanted: Living pupae of American silk-producing moths. W. S. Lowe, 35 Craven St., W. C. 2, London, England.

Wanted: For cash. Bred or perfect caught specimens, of Sphinx luscitiosa, Paonias astylus, and Deidamia inscriptum. Bred specimens of other species of Sphingidae, of the rarer sorts, would also be desirable. John M. Geddes, 331 High St., Williamsport, Pa.

Wanted—American sawflies. Tenthredinoidea, in exchange for other insects, chiefly Coleoptera. Correspondence may be in English. D. Dovnar-Zapolsky, P. O. Box 573, Agricultural Experimental Station, Entomological Section, Rostov on Don, Russia.

Have a number of pamphlets and books on N. A. and exotic Cerambycidae. Will exchange these for certain families of Heteroptera and Tabanidae. G. Chagnon, P. O. Box 521, Montreal, Canada.

Buprestidae.—Will determine and exchange Buprestidae of the world and exchange separata on this family. Dr. Jan Obenberger, Prague II., Václavské námêsti 1700, Museum, Czechoslovakia.

RECENT LITERATURE

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DIPTERA.

839.—**Landis** (E. M.).—A tabular account of the structural differences between the four larval instars of Culex pipiens. (Trans., **49**, 25-42, 1923) ..... .35

COLEOPTERA.

844.—**Davidson** (W. M.).—Biology of Scymnus nubes Casey. (Trans., **49**, 155-163, ill., 1923) ..... .20

LEPIDOPTERA.

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